



## Environmental NGOs Feedback on draft delegated directives for RoHS exemption categories 2b3, 3, 4c, 4e as well as UV light related 1fI, 2b4II, 4a, 4fIV

12 July 2021

The European Environmental Bureau, the Mercury Policy Project, and the Responsible Purchasing Network<sup>1</sup> welcome the draft proposals from the European Commission to finally revise the annex of the RoHS directive concerning lighting, though coming with a [5 year delay](#).

As per our letters sent in December 2019 and January 2020<sup>2</sup>, February 2020<sup>3</sup> and February 2021<sup>4</sup> we strongly urge the European Commission and DG Environment to review and remove exemptions for virtually all fluorescent and most high-intensity discharge (HID) lamps under the Restriction of Hazardous Substances for Electric and Electronic Products (RoHS) Directive, which based on the evidence, we conclude are no longer needed or justified. Phase out should take place at the earliest possible date, mainly for the larger categories including compact fluorescent lamps (CFLs), linear fluorescent lamps (LFLs), and low-wattage HID lamps.

Although the validity of the existing exemptions expired in July 2016, the delay in an actual decision by the Commission has led to these lamps still being allowed on the EU market, contributing to mercury pollution as well as much more expensive lighting, while more energy efficient mercury-free alternatives are available.

Mercury and its compounds are highly toxic to the developing nervous system as well as harmful to ecosystems and wildlife. Methylmercury, its most toxic form, has the capacity to bioaccumulate and bioconcentrate, especially in the aquatic food chain.

The EU via its 2005 mercury strategy, accompanied measures and as Party to the Minamata Convention on Mercury has as its objective to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds.

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<sup>1</sup> NGOs include the **European Environmental Bureau, (EEB)**, [www.eeb.org](http://www.eeb.org), is a federation of more than 170 environmental citizens' organisations based in over 35 countries in Europe. These organisations range from local and national, to European and international. The aim of the EEB is to protect and improve the environment of Europe and to enable the citizens of Europe to play their part in achieving that goal.

The **Mercury Policy Project (MPP)**, a project of the Tides Center, [www.mercurypolicy.org](http://www.mercurypolicy.org), works to promote policies to eliminate mercury uses, reduce the export and trafficking of mercury, and significantly reduce mercury exposures at the local, national, and international levels. We strive to work harmoniously with other groups and individuals who have similar goals and interests.

The **Responsible Purchasing Network**, [www.responsiblepurchasing.org](http://www.responsiblepurchasing.org), is a non-profit organization based in the United States that helps government agencies, institutions and businesses to specify, evaluate and purchase environmentally preferable goods and services.

<sup>2</sup> <https://eeb.org/library/making-the-case-for-a-ban-on-mercury-lamps/>

<sup>3</sup> <https://eeb.org/library/mercury-containing-lamp-exemptions-to-rohs-directive/>

<sup>4</sup> <https://eeb.org/library/why-hasnt-the-european-commission-banned-wasteful-lamps/>

Furthermore, most recently, under the European Green Deal, the EC has pledged 'to ensure a toxic-free environment', to 'help to protect citizens and the environment better against hazardous chemicals and encourage innovation for the development of safe and sustainable alternatives'.

Given the global implications of the RoHS directive, taking without further delay, definitive decisions to end the exemptions for compact and linear fluorescent lamps, will confirm and demonstrate the EU's commitment to the health and environmental objectives described above.

## 1. Introduction

As explained in our comments below, equivalent products with no mercury are widely available in the European marketplace and around the globe as lamp makers often advertise. They are listed in the online catalogues of multiple large and small lighting manufacturers such as Osram, Tungsram and Philips. Most importantly, drop-in replacement light-emitting diode (LED) *mercury-free* lamps, retrofit kits and fixtures are not only widely available but are also more energy-efficient and have a longer rated life than most types of fluorescent and HID lamps used for general lighting applications. In addition, LEDs are now cost competitive, giving consumers the opportunity to save money when their long life and ability to cut energy, replacement, and waste disposal costs are considered.

It is clear, that the lighting sector is a fast improving one in term of availability, performance and price of LED lamps, therefore policy decisions can and should go beyond of the current market as relevant.

Moreover, LEDs are more acceptable to consumers than CFLs and other types of mercury-added lamps because they are more easily dimmable and give off a higher quality of light. They also last longer, which benefits consumers' pocketbooks because LEDs don't have to be replaced as often. In addition, they don't break as easily. As HID replacements, LED lamps are more reliable, so streetlights are down less, preventing fewer accidents. They also don't emit UV like some HIDs. According to *Business Matters Magazine*<sup>5</sup>, there are many benefits to using LEDs, including:

1. LED lights last far longer than incandescent or halogen bulbs.
2. They are highly energy-efficient, converting most of their energy into light, rather than heat.
3. They are ecologically sound because they are mercury-free and have a long life, reducing the user's carbon footprint.
4. LEDs are very tough and durable, making them able to "stand up to harsh weather, vibrations, shocks, and abrasions.
5. LEDs are a safe light source, that can offer excellent colour rendering and great quality light; they have almost no UV emissions, making them good options for museums and food pantries,
6. LEDs offer great design flexibility: "LED light arrays can be placed and combined in an infinite number of ways to produce efficient – but also controllable – illumination. The colour, shade, brightness and distribution of light can be controlled to perfection, which makes for not only technically-useful lighting, but also soothing, uplifting or energising mood lighting."
7. They work well in extreme temperatures, including freezers, unlike most fluorescent lamps.

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<sup>5</sup> "The Top Nine Benefits of Using LED Bulbs," *Business Matters Magazine*, 10 November 2016, <https://www.bmmagazine.co.uk/in-business/top-nine-benefits-using-led-bulbs/>

8. They work instantly with no warm-up time and can be turned on an off many times without reducing their performance.
9. They work on low-voltage power, so they can be used outside.

Our comments below refer to draft delegated acts concerning the following lamp categories:

1. **2b3** - Non-linear tri-band phosphor lamps with tube diameter > 17 mm (e.g. T9):
2. **3(a)-(c)** - Proposed exemption 3(a) through 3(c): Mercury in cold cathode fluorescent lamps and external electrode fluorescent lamps (CCFL and EEFL) for special purposes not exceeding (per lamp): 3(a) Short length ( $\leq 500$  mm): 3,5 mg; 3(b) Medium length ( $> 500$  mm and  $\leq 1\,500$  mm): 5 mg; 3(c) Long length ( $> 1500$  mm): 13 mg, placed on the market before [PO: Date of adoption of the Delegated Directive]
3. **4c** - Mercury in other High Pressure Sodium (vapour) lamps for general lighting purposes not exceeding the following values (per burner): 4(c)-I  $P \leq 155$  W: 20 mg; 4(c)-II  $155$  W  $< P \leq 405$  W: 25 mg; 4(c)-III  $P > 405$  W: 25 mg.
4. **4e** - Mercury in metal halide lamps (MH)
5. **1f I** - For lamps designed to emit mainly light in the ultraviolet spectrum: 5 mg, proposed to expire in 5 years.
6. **2b4II** - Lamps emitting mainly light in the ultraviolet spectrum: 15 mg, proposed to expire in 5 years
7. **4a** - Mercury in low pressure non-phosphor coated discharge lamps, where the application requires the main range of the lamp-spectral output to be in the ultraviolet spectrum: up to 15 mg mercury may be used per lamp, proposed to expire in 5 years
8. **4fIV** - Mercury in high pressure sodium vapour lamps emitting light in the ultraviolet spectrum, proposed to expire in 5 years

## 2. Summary of Recommendations

COM proposals for Exemption as per Directive 2011/65		COM proposals	EEB/ RPN/MPP Recommendation
<b>1. Mercury in single capped fluorescent lamps not exceeding (per burner):</b>			
<b>1(f) I</b>	For lamps designed to emit mainly light in the ultraviolet spectrum:	5 Proposed to expire in 5 years	Allow exemption for 3 years only, given the lighting technology is fast advancing.
<b>2 (b) Mercury in other fluorescent lamps not exceeding:</b>			
<b>2 (b) (3)</b>	Non-linear tri-band phosphor lamps > 17 mm (e.g. T9)	15	Discontinue exemptions. Provide transition period, 12 months. This category should include both circular T9s and U-shaped T8s.
<b>2(b)(4) II</b>	Lamps emitting mainly light in the ultraviolet spectrum:	15 Proposed to expire in 5 years	Allow exemption for 3 years only, given the lighting technology is fast advancing
<b>3</b>	Proposed exemption 3(a) through 3(c): Mercury in cold	3(a) Short length ( $\leq 500$ mm): 3,5 mg; 3(b)	The exemptions should be discontinued with 12 months transition period.

	<i>cathode fluorescent lamps and external electrode fluorescent lamps (CCFL and EEFL) for special purposes not exceeding (per lamp):</i>	<i>Medium length (&gt; 500 mm and ≤ 1 500 mm): 5 mg; 3(c) Long length (&gt; 1500 mm): 13 mg, placed on the market before [PO: Date of adoption of the Delegated Directive]</i>	EEE are no longer manufactured with CCFL/EEFLs and LED retrofit kits are available as replacements for EEE already on the market.
<b>4 Mercury in High Intensity Discharge lamps for general lighting purposes</b>			
<b>4(a)</b>	<i>Mercury in other low pressure discharge lamps (per lamp)</i>	15 <i>Proposed to expire in 5 years</i>	Allow exemption for 3 years only, given the lighting technology is fast advancing.  Consider submission from Typhon Treatment systems – submitted on 4 February 2019 to the Commission.
<b>4(c)</b>	<i>Mercury in other High Pressure Sodium (vapour) lamps for general lighting purposes not exceeding</i>	I) $P \leq 155 \text{ W}$ : 25 mg per burner	Discontinue exemptions up to 400 W. Provide transition period of 12 months.
		II) $155 \text{ W} < P \leq 405 \text{ W}$ : 30 mg per burner	The higher wattage ones should be reviewed in 3 years' time as lighting technology is advancing fast.
		III) $P > 405 \text{ W}$ : 40 mg per burner	
<b>4(e)</b>	<i>Mercury in Metal Halide (MH) Lamps</i>	<i>Proposed to expire in 5 years</i>	Discontinue exemption for quartz MH lamps, with a 12 month transition period. Allow exemption for ceramic metal halide (CMH) lamps for 3 years, as they have less mercury, a higher efficiency, and a longer rated life than quartz MH lamps. CMH lamps are widely available up to 250 watts.  Monitor improved availability, performance and price of LED retrofit lamps for metal halide lamps and consider an expiry date for some types of MH lamps as they become practical.
<b>4f IV</b>	<i>Mercury in high pressure sodium vapour lamps emitting light in the ultraviolet spectrum,</i>	<i>Proposed to expire in 5 years</i>	Allow exemption for 3 years only, given the lighting technology is fast advancing

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## 4. Analysis and Recommendations

### 4.1 [Proposed exemption \(2b3\) Non-Linear tri-band phosphor lamps](#) -

For this exemption for *Non-linear tri-band phosphor lamps with tube diameter > 17 mm (e.g. T9): 10 mg*, a 3 year extension is proposed to be granted, by the European Commission, with the mercury limit reduced from 15 mg to 10 mg. This includes both circular T9s and u-shaped T8s.

**Recommendation: We propose that this exemption should be revoked with a 12-month transition period, which is the same as other tri-band phosphor linear fluorescent lamps.**

A 3-year exemption on this category of fluorescent lamps is unwarranted as LED drop-in replacements are available from major suppliers. LED replacements for U-shaped T8 fluorescent lamps as well as circular T9 fluorescent lamps are widely available in the European and global marketplaces.

#### Summary - 4000-character submission text

**We propose that this exemption should be revoked with a 12-month transition period, which is the same as other tri-band phosphor linear fluorescent lamps.**

A 3-year exemption on this category of fluorescent lamps is unwarranted as LED drop-in replacements are available from major suppliers. LED replacements for U-shaped T8 fluorescent lamps as well as circular T9 fluorescent lamps are widely available in the European and global marketplaces. (See documentation attached).

Manufacturers have invested in the development of non-linear, mercury-free LED alternatives for category 2(b)(3), just the same as they have invested in developing linear lamps which are being proposed for phase-out. Mercury-free LED alternatives are widely available and can be directly retrofitted into existing fluorescent luminaires. Furthermore, they are widely available with different lifetimes, light output, colour temperatures, and so-on. These LED retrofit non-linear lamps have the added benefit of 2-3 times longer lifetime than fluorescent lamps and they use half the energy (or less). As examples among others see: [Osram's SubstiTUBE U-shaped LED lamps](#) , [SubstiTUBE T9 circular LED lamps](#) , [Philips/Signify CorePro LEDtube Circular Lamps](#).

As a result the RoHS criteria for granting an extension for this lamp category, are clearly not met any longer.

No more delays should occur in the decision-making process since as a consequence mercury will keep being added to the environment, additional CO2 emitted and millions of euro lost per day as [recent studies show](#).

### 4.1.1 U-Shaped T8 Lamps

Modern U-bent T8s, which are the most common fluorescent lamps that fall under this exemption for non-linear tri-band phosphor lamps with tube diameter >17 mm (e.g., T9) although they are not specifically called out in the title of this exemption.

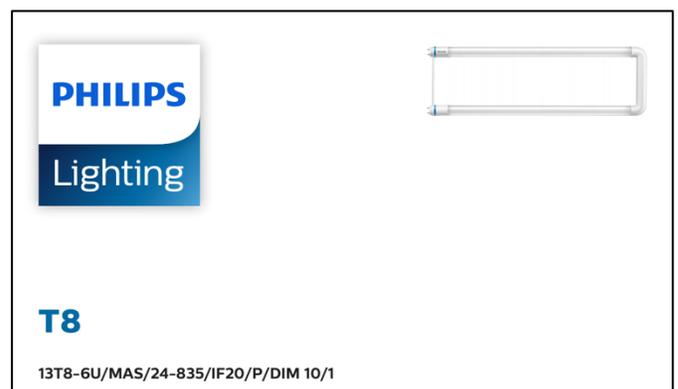
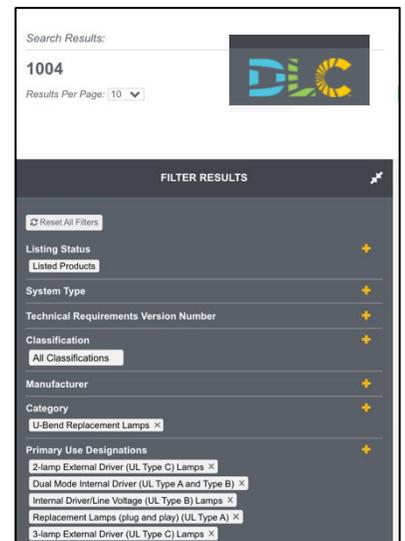
LED U-shaped T8 lamps, which have a higher energy efficiency and longer rated life than U-shaped fluorescent T8s, are available in the European marketplace. For example:

[Osram's SubstiTUBE U-shaped LED lamps](#) are plug-and-play replacements for u-shaped T8 fluorescent lamps that run on electromagnetic control gear. They also can be hardwired onto mains. They come in various wattages and sizes that are designed to replace fluorescent u-bent lamps. For example, Osram offers 8W and 20W models. According to Osram, these products have an efficacy of 137 lumens/watt and a rated life of 50.000 hours, which is about twice the rated life of a typical u-shaped fluorescent tube lamp, and offer the following benefits:

- *Quick, simple and safe replacement without rewiring*
- *Energy savings of up to 65 % (compared to T8 fluorescent lamp on CCG)*
- *Operation directly on 230 V AC mains possible*
- *Instant-on light, therefore ideally suitable in combination with sensor technology*
- *Very high resistance to switching loads*
- *Also suitable for operation at low temperatures*

There are a significant number of u-shaped LED lamps available in the global marketplace. For example, there are over 1000 models of u-shaped LED T8 lamps listed on the [DesignLights Consortium \(DLC\) Qualified Product List](#). These products have been approved by a collaboration of utilities and lighting manufacturers in the United States. However, many of these products are likely to be found in the EU marketplace – or could be sold in the EU marketplace because they are available from European lamp manufacturers (e.g., LEDVANCE (OSRAM Sylvania), Signify (Philips Lighting), GE Current (Tungshram), Eiko, Technical Consumer Products, RAB, etc.) See screenshot from DCL QPL, accessed on 7 July 2021, right.

An example of a product on the DLC list that is manufactured by a European-based company is a 13 -watt u-shaped T8 manufactured by Philips (Signify), which is based in the Netherlands. It is a plug-and-play (Type A) replacement for u-shaped fluorescent lamps that has a rated life of 70.000 hours. For a complete list of DLC-listed u-shaped LED lamps, go to [www.designlights.org/search/](http://www.designlights.org/search/).

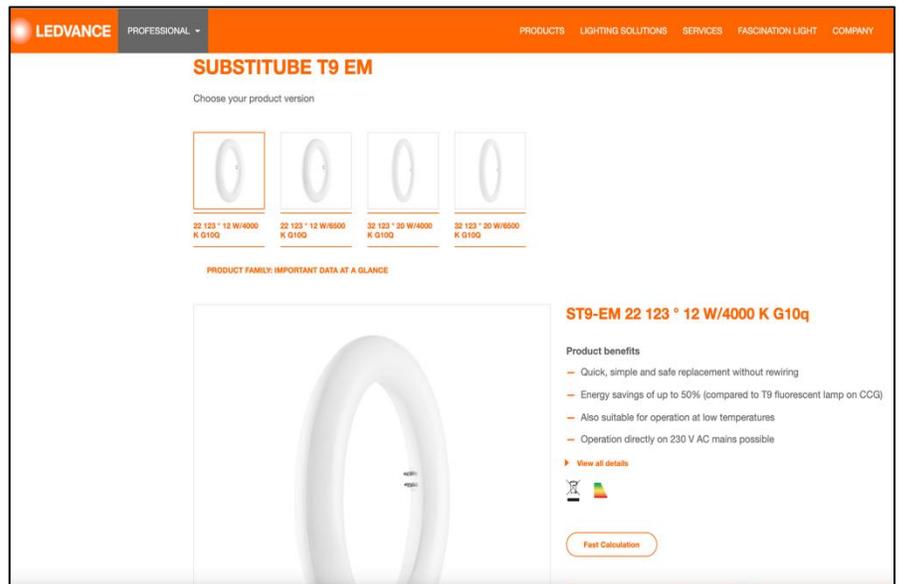


#### 4.1.2 Circular T9 Lamps

Circular T9 fluorescent lamps, which are explicitly covered under this exemption, like many T12 linear fluorescent lamps, run on electromagnetic control gear (CCG) and compared to LEDs are less efficient and have a relatively short life. Osram's [Lumilux T9 C](#) fluorescent circular lamp with a G10q base, for example, has an efficiency of only 61 lumens/watt (despite having a Colour Rendering Index of 80-89) and a rated life of only 9.000 hours. According to Osram, this product contains 5 mg of mercury. These are actually similar to the T5 circular lamps, which are under category/exemption 1e, which are currently proposed for phase-out within 12 months.

Circular LED T9 lamps, which are available in the European marketplace, are more energy-efficient and longer-lasting drop-in replacements for circular T9 fluorescents lamps. For example:

**LEDVANCE (Osram)** has a professional line of [SubstiTUBE T9 circular LED lamps](#) that as an A+ energy rating, an efficiency of 100 lumens/watt, and a nominal lamp life of 30.000 hours. Osram claims this product is a “Quick simple and safe replacement without rewiring” and offers “Energy savings of up to 50% (compared to T9 fluorescent lamp on CCG)”. See except from this product brochure, dated July 24, 2019, right.



**Signify (Philips)** has a family of [CorePro LEDtube Circular Lamps](#) that “is specially designed to replace fluorescent T9 circular tubes working on a G10q fitting”. This “plug-and-play” product line has an A+ Energy Efficiency Label and a 30.000 hour rated life. It replaces fluorescent T9 circular lamps that are less efficient and have a much shorter rated life. See summary description of the features, benefits and applications of this circular LED product line below.



**The professional Circular LED solution**

**CorePro LEDtube circular**

The CorePro LEDtube Circular integrates a LED light source into a traditional fluorescent tube form factor. This product is specially designed to replace fluorescent circular tubes working on a G10q fitting. It offers significant energy savings and a long lifetime, in a similar form factor.

**Benefits**

- A simple, fast, plug-and-play retrofit solution
- Significant energy saving
- Long lifetime

**Features**

- Highly energy-efficient
- Long lifetime
- Easy installation
- Conventional form factor to fit into existing luminaires

**Application**

- Home use
- Corridors and stairways
- Parking

**4.2 Proposed exemption 3(a) through 3(c): Mercury in cold cathode fluorescent lamps and external electrode fluorescent lamps (CCFL and EEFL) for special purposes not exceeding (per lamp): 3(a) Short length (≤ 500 mm): 3,5 mg; 3(b) Medium length (> 500 mm and ≤ 1 500 mm): 5 mg; 3(c) Long length (> 1500 mm): 13 mg, placed on the market before [PO: Date of adoption of the Delegated Directive]**

For this exemption a 5-year extension is proposed to be granted by the European Commission.

**Recommendation: We propose that this exemption should be revoked with a 12-month transition period.** There is no justification to continue the exemption for CCFLs and EEFLs since they are no longer used for new electronic equipment and LED retrofit kits are available if an existing backlight accessory needs to be replaced.

**Summary - 4000-character text**

**We propose that this exemption should be revoked with a 12-month transition period.** There is no justification to continue the exemption for CCFLs and EEFLs since they are no longer used for new electronic equipment and LED retrofit kits are available if an existing backlight accessory needs to be replaced.

To our understanding, this category of lamps is scheduled to be phased-out by the Ecodesign lighting regulation, [EU Regulation No. 2019/2020](#) on 1 September 2021, therefore this COM proposal appears to contradict existing EU law. There are no exemptions made for CCFL and EEFL under the

Ecodesign directive, therefore they are subject to the “Other light sources in scope not mentioned above” category in Table 1 of the regulation which they cannot meet.

LEDs and OLEDs have taken over the global backlighting market and CCFLs and EEFLs are no longer used to back-light electronic displays placed on the market – this technology was replaced by LED back-lighting units in televisions ten years ago.

LEDs have replaced cold cathode fluorescent lamps (CCFL) in LCD backlight applications used for panels in small devices including smartphones and tablets as well as large appliances and electronics such as TVs, PC monitors, and notebooks. Thanks to their higher luminous efficiency and far smaller form factor, LEDs enable more effective positioning of the light sources behind the panel. LED backlight technology is now being used extensively by many sectors including LCD displays and other types of consumer electronics (e.g., TV set, gaming console), point of sale systems, medical instruments, automotive lighting, and more. Other advantages of LED backlighting technologies include less visible flickering, improved color and contrast, adjustable brightness, and a thinner footprint.<sup>6</sup>

LED backlighting retrofit kits are available in various sizes (some are customizable, meaning they can be cut down to the size needed), light outputs and can replace CCFLs backlight components that are no longer working. These are available on-line.

Upgrading a CCFL backlight system to LEDs will improve the light quality of the screen as well as the product’s energy efficiency. See advertisement below for LED Backlight Kits, which can replace CCFL backlight components, yielding several benefits: “LED has a longer lifespan, typically lasting over 100,000 hours (last 10X longer than CCFL). Being solid state devices, LED will perform exactly as when they were manufactured as opposed to CCFL which lose [sic] light output continuously over their life – up to 50%.”

No more delays should occur in the decision-making process since as a consequence mercury will keep being added to the environment, additional CO2 emitted and millions of euro lost per day as [recent studies show](#).

See attached for more details.

To our understanding, this category of lamp is scheduled to be phased-out by the Ecodesign lighting regulation, [EU Regulation No. 2019/2020](#) on 1 September 2021, therefore this COM proposal appears to contradict existing EU law. There are no exemptions made for CCFL and EEFL under the Ecodesign directive, therefore they are subject to the “Other light sources in scope not mentioned above” category in Table 1 of the regulation which they cannot meet.

#### **4.2.1 LED Backlighting in New Electronic Equipment**

LEDs and OLEDs have taken over the global backlighting market and CCFLs and EEFLs are no longer used to back-light electronic displays placed on the market – this technology was replaced by LED back-lighting units in televisions ten years ago.

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<sup>6</sup> Stone Tech, “11 Advantages of LED Backlight Display Technology,” 17 October 2019, <https://www.stoneitech.com/news/sharing/advantages-of-led-backlight-display.html>.

As *Digital Trends* magazine reported in February 2021, “Older LCD TVs used cold cathode fluorescent lamps (CCFLs) to provide lighting, whereas LED LCD TVs used an array of smaller, more efficient light-emitting diodes (LEDs) to illuminate the screen. Since the technology is better all LCD TVs now use LED lights and are colloquially considered LED TVs.”<sup>7</sup> According to marketwatch.com, “Compared with the traditional CCFL (cold cathode tube) backlight, LED has the characteristics of low power consumption, low heat generation, high brightness and long life. It is expected to completely replace the traditional backlight system in recent years.”<sup>8</sup>

An April 2020 report by *Research and Markets*, projected, “The increasing demand for backlight LED in the advertising industry is expected to drive the market in the forecast period [2020-2030].” Specifically, it reported that, “Backlight LED offers high flash and fade frequencies which helps the advertisers to showcase their products with better visibility. The LED backlight produces even light with less power consumption compared to fluorescent backlights. The maintenance cost of LED backlights used in billboards is also very minimum and saves 90% on power when compared to other light bulbs. These advantages offered by LED backlights will boost the market in the forecast period.”<sup>9</sup>

LEDs have replaced cold cathode fluorescent lamps (CCFL) in LCD backlight applications used for panels in small devices including smartphones and tablets as well as large appliances and electronics such as TVs, PC monitors, and notebooks. Thanks to their higher luminous efficiency and far smaller form factor, LEDs enable more effective positioning of the light sources behind the panel. LED backlight technology is now being used extensively by many sectors including LCD displays and other types of consumer electronics (e.g., TV set, gaming console), point of sale systems, medical instruments, automotive lighting, and more. Other advantages of LED backlighting technologies include less visible flickering, improved color and contrast, adjustable brightness, and a thinner footprint.<sup>10</sup>

Another technology that is increasingly taking over the backlight market is OLED. It is currently used most often in high-definition TVs and commercial technologies, although its cost is starting to come down. One of the primary benefits of OLEDs is that it “is easier on human eyes than LCDs, even at high level of luminescence, resulting in lower eye fatigue than LCD displays.” According to Dr. James Sheedy of Pacific University, “OLED is a human-friendly technology as high luminance normally results in eye fatigue but OLED is less stressful to the eye than LCD thanks to its lesser emission of blue light.”<sup>11</sup>

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<sup>7</sup> *Digital Trends*, “LED Vs. LEC TVs Explained: What’s the Difference?”, 7 February 2021, <https://www.digitaltrends.com/home-theater/led-vs-lcd-tvs/#:~:text=Older%20LCD%20TVs%20used%20cold,are%20colloquially%20considered%20LED%20TVs.>

<sup>8</sup> *Global LED Backlight Driver Market Share 2020-2025 with Top Countries Data and COVID-19 Analysis, Industry Size, Share, Future Challenges, Revenue, Demand, Industry Growth and Top Players Analysis and Forecast*, 1 June 2021; <https://www.marketwatch.com/press-release/global-led-backlight-driver-market-share-2021---2025-with-top-countries-data-and-covid-19-analysis-industry-size-share-future-challenges-revenue-demand-industry-growth-and-top-players-analysis-and-forecast-2021-06-01>

<sup>9</sup> *Research and Markets, Backlight LED Markets & COVID-19 (2020-2030): Shares, Size & Growth, Segmentation, Regional & Country Breakdowns, Competitive Landscape, Trends and Strategies, PR Newswire, 21 April 2020, <https://www.prnewswire.com/news-releases/backlight-led-markets--covid-19-2020-2030-shares-size--growth-segmentation-regional--country-breakdowns-competitive-landscape-trends-and-strategies-301044620.html>*

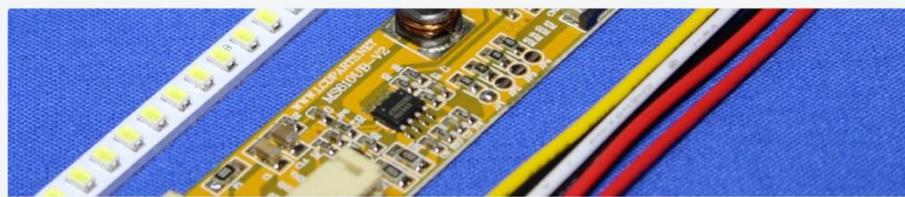
<sup>10</sup> Stone Tech, “11 Advantages of LED Backlight Display Technology,” 17 October 2019, <https://www.stoneitech.com/news/sharing/advantages-of-led-backlight-display.html>.

<sup>11</sup> LG Display Flicks Switch on OLED in Europe, Targets Premium TV Market – *LEDinside*, 31 October 2017.

## 4.2.2 LED backlighting retrofit kits

LED backlighting retrofit kits are available in various sizes and light outputs and can replace CCFLs backlight components that are no longer working. These are available on-line.

Upgrading a CCFL backlight system to LEDs will improve the light quality of the screen as well as the product's energy efficiency. See advertisement below for LED Backlight Kits, which can replace CCFL backlight components, yielding several benefits: "LED has a longer lifespan, typically lasting over 100,000 hours (last 10X longer than CCFL). Being solid state devices, LED will perform exactly as when they were manufactured as opposed to CCFL which lose [sic] light output continuously over their life – up to 50%."



**LED Backlight Kits**

Are you tired of constantly replacing CCFL backlight lamps again, again and again on LCD Screen? When the situation has no time for downtime? To extend its life and improve its performance, upgrading to UB Series LED backlight kit is the best option.

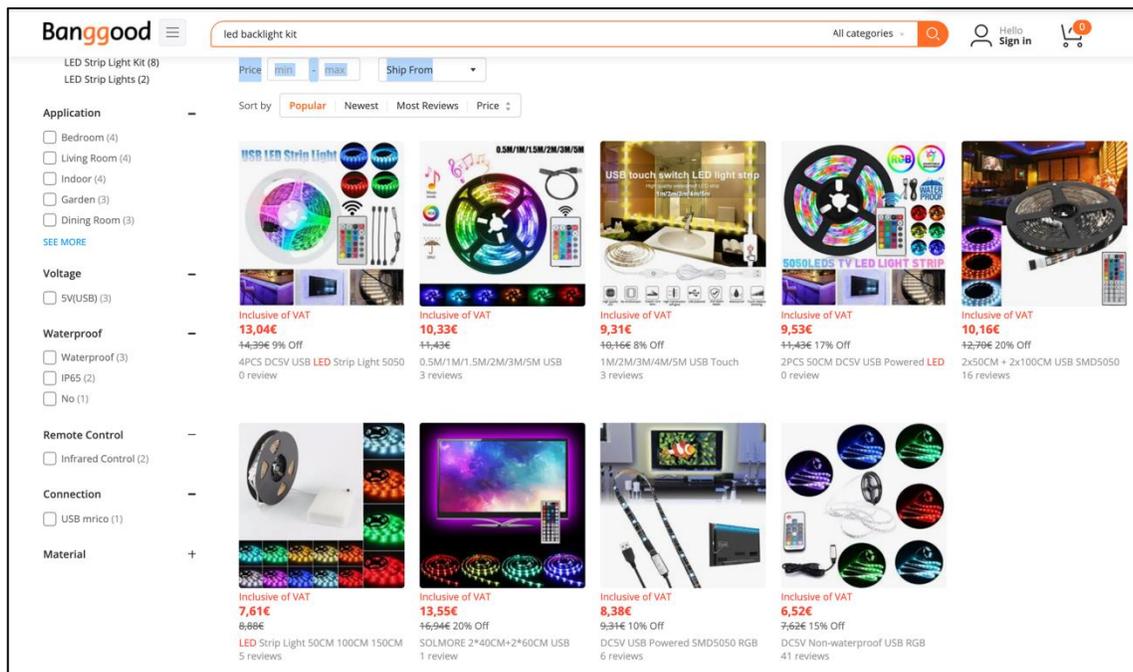
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According to *Digital Trends* magazine, consumers can improve the quality of their LCD TV by replacing its CCFL backlighting system with LEDs. "Full-array backlighting swaps the outdated CCFLs for an array of LEDs spanning the back of the screen, comprising zones of LEDs that can be lit or dimmed in a process called local dimming. TVs using full-array LED backlighting make up a healthy chunk of the high-end LED TV market, and with good reason – with more precise and even illumination, they can create better picture quality than CCFL LCD TVs were ever able to achieve, with better energy efficiency to boot."<sup>12</sup>

Some LED backlight kits are designed for specific brands of electronic equipment, while others are "universal." See screenshots of various LED backlight kits below.

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<sup>12</sup> *Digital Trends*, "LED Vs. LEC TVs Explained: What's the Difference?", 7 February 2021, <https://www.digitaltrends.com/home-theater/led-vs-lcd-tvs/#:~:text=Older%20LCD%20TVs%20used%20cold,are%20colloquially%20considered%20LED%20TVs.>



LED backlight kits are available in various size – and some are customizable, meaning they can be cut down to the size needed.

LED backlighting products are available for a wide array of applications. While LED backlight kits are often sold by smaller resellers for use by electronics repair companies (e.g. ifixit) or do-it-yourselfers, others are manufactured by large lighting companies such as LEDVANCE (OSRAM) for use by companies in advertising and other sectors. See screenshot below.



While some backlight kits provide backlighting, only; others offer other features, such as connections to “Alexa”. See example of this below.

Govee WiFi LED TV Backlight with Camera for 55-65 Inch TV and PC RGBIC App Control Compatible with Alexa and Google Assistant for TV and PC  
★★★★☆ 1,209  
2 used and new from €59.22



**Govee** PRODUCTS ▾ FLASH SALES COMMUNITY SUPPORT

Fast Shipping 1 Year Warranty Lifetime Customer Support 30 Day Money Back Guarantee

# Every Side Covered

Govee Immersion TV backlights are perfect for most 55-65inch flatscreens Reinvent how you binge-watch your favorite Netflix shows with dynamic colors emitting from every corner of your TV.

Furthermore, there is an urgency for ending this exemption and hastening the complete transition to LEDs since CCFLs create health and environmental hazards when products

containing them are recycled at the end of their useful life. The WEEE Handbook explained this problem:

*Disassembly studies on LED equipment have shown that CCFL lamps are discovered broken during disassembly. It is clear the fragility of CCFLs in LCDs will lead to breakage during manual disassembly or automated shredding of LCD panels. For both processes, the airborne release of mercury from CCFLs has significant eco-toxicity potential.<sup>13</sup>*

#### **4.2.3 LED lighting systems for aircrafts**

The aircraft industry has not been slow to recognize and exploit the compelling aesthetic and performance features of LED lighting technology. Their critical demands of low power, small size, high reliability, and mechanical stability are more than met by the characteristics of LEDs, adding long life, flexible form-factor, and improved light quality to the mix. LEDs tick all the boxes. New designs of light, leisure aircraft, business jets, commercial airliners and many military aircraft are now 'de facto' incorporating LED lighting both internally and externally, from cabin signage to landing lights. LED and LED driver technology have also advanced sufficiently to be widely accepted for backlighting LCDs and instrumentation panels in the aircraft cockpit. LED lighting has achieved widespread adoption in the avionics world, installed virtually everywhere inside and outside all new aircraft designs. Increasingly, it is being retrofitted in existing aircraft (this being said already in 2014)<sup>14</sup>.

LED backlight retrofit kits are also available for F16 aircrafts<sup>15</sup>.

Commercial aircraft original equipment manufacturers are focused on developing next-generation aircraft with reduced fuel consumption and decreased noise and carbon emission levels. With the growing demand for air travel, the need for new-generation aircraft will significantly increase in the coming years, fueling commercial aircraft LED lighting system market growth. The commercial aircraft led lighting system market size to grow by USD 163.58 million during the period 2020-2024<sup>16</sup>.

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<sup>13</sup> See also "Evaporation of Mercury from CCFLs during Recycling of LCD Television Sets," 2013 December, [https://www.researchgate.net/publication/260246422\\_Evaporation\\_of\\_Mercury\\_from\\_CCFLs\\_during\\_Recycling\\_of\\_LCD\\_Television\\_Sets](https://www.researchgate.net/publication/260246422_Evaporation_of_Mercury_from_CCFLs_during_Recycling_of_LCD_Television_Sets)

<sup>14</sup> <https://www.digikey.fr/en/articles/led-backlighting-of-instruments-on-the-flight-deck>

<sup>15</sup> <https://fddocuments.in/document/f-16-ccmfd-led-backlight-retrofit-mediaaerospacefiles-f-16-ccmfd-led.html>

<sup>16</sup> <https://www.businesswire.com/news/home/20210104005490/en/New-Commercial-Aircraft-LED-Lighting-System-Market-Research-Report--COVID-19-Analysis-Based-on-WCF-LED-Lighting-System-Reading-LED-Lighting-System-and-Lavatory-LED-Lighting-System-Types-Technavio>

**4.3 [Proposed exemption 4c: Mercury in other High Pressure Sodium \(vapour\) lamps for general lighting purposes not exceeding the following values \(per burner\): 4\(c\)-I  \$P \leq 155 W\$ : 20 mg; 4\(c\)-II  \$155 W < P \leq 405 W\$ : 25 mg; 4\(c\)-III  \$P > 405 W\$ : 25 mg.](#)**

**Recommendation:** Discontinue the exemption for HPS models up to 400 Watts with a phase-out period of 12 months. For models over 400 watts, the exemption should be reviewed in 3 years or less.

Since LEDs (and mercury-free HPS lamps) are widely available now that can replace high-pressure sodium lamps (up to 400 watts) as well as other low-wattage HID's such as metal halides, we urge the European Commission to consider these findings and work to develop an expiry date for this category of mercury-containing lamps.

**Summary - 4000-character text**

**We recommend discontinuing the exemption for HPS models up to 400 Watts with a phase-out period of 12 months. For models over 400 watts, the exemption should be reviewed in 3 years or less.**

Since LEDs (and mercury-free HPS lamps) are widely available now that can replace high-pressure sodium lamps (up to 400 watts) as well as other low-wattage HID's such as metal halides, we urge the European Commission to consider these findings and work to develop an expiry date for this category of mercury-containing lamps.

High-pressure sodium lamps (HPS), which primarily have been used for street lighting and other exterior lighting applications, are rapidly becoming replaced by LEDs because HPS lamps:

- Have poor colour quality – many HPS lamps appear yellow because their CRI is typically in the 20s; this reduces visibility.
- Cycle on and off, which causes maintenance and safety problems; and
- Have a relatively short life (10.000 to 25.000 hours).

Manufacturers tout multiple environmental, safety and health benefits that result from -replacing HPS lamps with LED lamps. These benefits include:

- Significantly improved energy efficiency as well as interoperability with lighting controls, which can increase efficiency even more and improve performance;
- Longer life (often 50.000 hours – or twice as long as HPS lamps, which translates into lower maintenance and replacement costs) as well as reduced lifecycle environmental impacts;
- Instant on (no warm-up time or “cycling”);
- Effective thermal management for a wide operating temperature range;
- Effective lumen maintenance;
- Improved visibility, which increases safety (LEDs emit a higher quality of light, which is white rather than the yellow light that is emitted from HPS lamps.); and
- Elimination of mercury, which reduces worker exposure risks and waste disposal costs.

Over the past few years, there has been a significant increase in the number of LED replacements for high-intensity discharge (HID) lamps – particularly LEDs that can replace high-pressure sodium (HPS) lamps up to 400 watts. Consequently, there are many LED lamps available in the European

marketplace that can replace mercury-containing high-pressure sodium (HPS) lamps. Examples include:

**[Philips TrueForce LED lamps](#)**, which are its alternative to HPS and other types of high-intensity discharge (HID) lamps, are available in a variety of wattages, lumen outputs, shapes and sizes. They can replace HPS lamps for many applications such as street lighting, parking lots and garages, pedestrian walkways, warehouses and other industrial and retail applications.

**[Tungram/GE LED HID lamps](#)**, which are designed to replace mercury vapour, high-pressure sodium (HPS), and metal halide lamps. This product line includes:

- 35-watt models that are a replacement for HPS lamps up to 70 watts;
- 80-watt models that are a replacement for HPS lamps up to 150 watts; and
- 150-watt models that are a replacement for HPS lamps up to 400 watts.

According to this manufacturer, "The upgraded [HPS] fixture [that has LED replacement lamps] will deliver up to 80% energy savings and reduced operating cost driven by the increased life."

**[OSRAM NAV LED](#)** lamps, which are a "direct LED retrofit for traditional high-pressure sodium vapor lamps in outdoor applications." According to the manufacturer, these lamps have an efficiency of up to 185 lumens/watt and a shape that enables them to fit into existing HPS fixtures.

No more delays should occur in the decision-making process since as a consequence mercury will keep being added to the environment, additional CO2 emitted and millions of euro lost per day as [recent studies show](#).

See attached for more details.

Manufacturers tout multiple environmental, safety and health benefits associated with replacing HPS lamps with LED lamps. These benefits include significantly improved energy efficiency, longer life (which translates to lower maintenance and replacement costs), instant on (no warm-up time or "cycling"), elimination of mercury, effective thermal management for wide operating temperature range, effective lumen maintenance, and improved visibility, which increases safety.

There are many LED replacement lamps available that can replace mercury-containing high-pressure sodium (HPS) lamps.

High-pressure sodium lamps (HPS), which primarily have been used for street lighting and other exterior lighting applications, are rapidly becoming replaced by LEDs because HPS lamps:

- have poor colour quality – many HPS lamps appear yellow because their CRI is typically in the 20s; this reduces visibility;
- cycle on and off, which causes maintenance and safety problems; and
- have a relatively short life (10.000-25.000 hours).

Over the past few years, there has been a significant increase in the number of LED replacements for high-intensity discharge (HID) lamps – particularly LEDs that can replace high-pressure sodium (HPS) lamps up to 400 watts. According to Global Industry Analysts:

*The global market for High Intensity Discharge (HID) Bulbs is forecast to decline to US\$1.0 billion by 2024, constrained by the growing threat of substitution by light-emitting diode (LEDs) and high*

*efficiency plasma lights. HID bulbs which have been used for years to light streets and factories are today being rapidly replaced by LEDs. Rising energy costs and tighter energy-efficiency standards and regulations are playing major roles in accelerating the phase out of HID lighting technology. Few of the benefits of LED driving its popularity as a replacement for HID include higher energy efficiency due to lower quotient of trapped light; high efficiency at higher operating temperatures; greater effectiveness of LED power drivers over HID ballasts; and longer durability with an operating life over 10 to 12 years.*<sup>17</sup>

According to the International Dark Sky Association, “Early LEDs were energy-inefficient and emitted little light, but due to technological advances, LED efficiency and light output have doubled about every three years. Because of their improved quality and falling prices, LEDs are now replacing conventional high-intensity discharge (HID) lamp types for outdoor lighting in communities around the world.”<sup>18</sup>

LED lamps can replace many types of HIDs including both high-pressure sodium (HPS) and metal halide lamps, which contain a significant amount of mercury. LED lamps are now available in a wide array of sizes, wattages and lumen outputs and with a variety of commonly used HID bases.

Suitable applications – both indoor and outdoor – include, but are not limited to:

- High-bay Lighting
- Street lights
- Garages
- Parking Lots and Area lighting
- Pedestrian zones and Parks
- Industry
- Retail and Museums

LED lamps that can replace high-pressure sodium lamps are available in a variety of color temperatures (typically ranging from 2700K (warm) to 6500K. Their color quality (typically measured in CRI) is quite high, often 70-90, which makes them more versatile than conventional, low-CRI HPS lamps.

**As it can be seen below, the statement in the final 2016 report that was used to justify continuation of this exemption, no longer holds and is out of date: “mercury-free substitutes are available on the system level (for use in new light emitting diode (LED) luminaires), but such substitutes are not compatible as substitutes in existing High Pressure Sodium (vapour) (HPS) lamps (component replacement).”**

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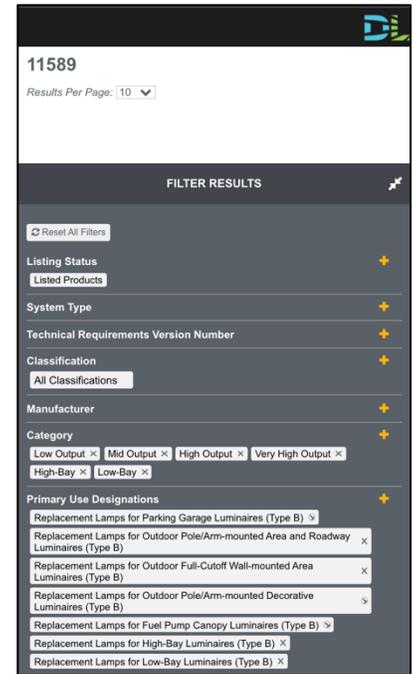
<sup>17</sup> Global Industry Analysts, “High Intensity Discharge (HID) Lighting: Market Analysis, Trends and Forecasts, 2018 May.

<sup>18</sup> International Dark Sky Association, *LED Practical Guide*, <https://www.darksky.org/our-work/lighting/lighting-for-citizens/led-guide/>.

The DesignLights Consortium (DLC), a collaboration of utilities and lamp manufacturers based in the United States, has nearly 12,000 LED replacements for HID lamps on its Qualified Products List (QPL). These products are compatible with existing fixtures because they are not designed to run off the existing ballast. Instead, they bypass it. Most (~11,500 models) are UL Type B LED lamps, which means they have an internal driver. The rest (~500 models) are UL Type C, which have an external driver.

LED lamp manufacturers understand that their LED lamps need to be able to be used in existing HID fixtures and have designed their products accordingly. See screenshot of DLC list for this category of products.

It is important to note that many of the manufacturers with LED lamps that can replace HID on the DLC list sell products in the European marketplace (e.g., Signify/Philips, LEDVance/Osram Sylvania, GE/Tungshram).



Below are examples of LED lamps listed in European lighting catalogues, including statements about their ability to work in (i.e., retrofit) existing fixtures.

- Philips TrueForce Core LED HPL Lamps** have the same size, shape and base type as conventional high-pressure sodium (HPS) lamps, so they seamlessly fit in existing fixtures. They are available in 13W-36W models, offer approximately 75% reduction in energy consumption, and have a rated life equivalent to standard HPS lamps (25.000 hours). Users have the option of running this “hybrid” LED lamp on the existing magnetic ballast (making it a simple plug and play option) or bypassing the ballast (because it has an internal

**PHILIPS**  
Lighting

**Trueforce CorePro  
LED HPL**

**TForce Core LED HPL 36W E40 840 FR**

The new Philips Trueforce Core LED HPL lamps offer you an easy, short-payback LED solution to replace High Intensity Discharge (HID) lamps. This new generation of products brings all the energy-efficiency and long-lifetime benefits of LED to HID replacement, while providing instant saving with a low initial investment. Furthermore, they're designed to have the same lamp size and light distribution as other HID lamps, so you will never know the difference. All thanks to our High-Power LED filament technology. Plus, its unique IP65 design means that it can be used for outdoor use as well as indoor use.

(because it has an internal driver). See screenshots describing this product below. (Source: Philips Lighting Company, 23 June 2021; [https://www.lighting.philips.co.uk/prof/led-lamps-and-tubes/led-hid-replacement/trueforce-corepro-led-hpl/929002481502\\_EU/product](https://www.lighting.philips.co.uk/prof/led-lamps-and-tubes/led-hid-replacement/trueforce-corepro-led-hpl/929002481502_EU/product))

**Philips TrueForce LED lamps**, which are its alternative to HPS and other types of high-intensity discharge (HID) lamps, are available in a variety of wattages, lumen outputs, shapes and sizes. They are designed to replace HIDs in streetlights, parking garages, industrial high bay applications and more. Philips claims these products can easily retrofit existing HID luminaires without having to change the ballast or fixture. See summary of the availability and benefits of this line of LED replacement lamps for HIDs from Philips Lighting Global Catalogue,

<https://www.lighting.philips.com/main/products/trueforce-led-lamps>. Philips also has developed a table demonstrating that these products are **compatible** with the existing HPS ballasts, which are largely electromagnetic.

**Benefits**

- Similar look and feel as conventional HID SON/HPL lamps
- Perfect fit in HID luminaires on existing EM ballast or mains connection
- IP65 design suitable for indoor and outdoor use

**Features**

- High-power LED filament technology
- Frosted glass finish, uniform light distribution
- Compact size
- IP65 design
- 2 KV surge protection

**Application**

- Public urban – streets, parks, squares
- Public roads – streets, public areas
- Industrial buildings and warehouses

**Discover the TrueForce LED range**



**TrueForce LED Public (Urban/Road – HPL/SON)**

[View family >](#)



**TrueForce LED Public (Road/Area – SOX)**

[View family >](#)



**TrueForce LED Public (Road – SON)**

[View family >](#)



**TrueForce LED Public Mains**

[View family >](#)



**TrueForce LED Industrial and Retail Mains (Highbay – HPI/SON/HPL)**

[View family >](#)



**TrueForce LED Industrial and Retail (Highbay – MH)**

[View family >](#)



**TrueForce Core LED Industrial and Retail (Highbay – HPI/SON/HPL)**

[View family >](#)



**TrueForce LED Industrial and Retail (Highbay – HPI/SON/HPL)**

[View family >](#)



**Trueforce CorePro LED HPL**

[View family >](#)



**TrueForce LED Public (Urban/Road – HPS/MH)**

[View family >](#)

**Benefits**

- ✓ Easy adoption – no need to change the fixture
- ✓ Fast payback – usually less than two years
- ✓ Sustainability – low energy consumption
- ✓ Right light distribution – enhances comfort and safety
- ✓ Low investment, long lifetime – up to 50,000 hours

**Applications**

- TrueForce LED Industry and Retail
- Trueforce LED Urban
- TrueForce LED Public

**Tungfram/GE** offers several LED lamps designed to replace HID (such as mercury vapour, high-pressure sodium (HPS), and metal halide lamps). This includes:

- 35-watt models that are a replacement for HPS lamps up to 70 watts;
- 80-watt models, which are replacements for HPS lamps up to 150 watts; and
- 150-watt models, which are replacements for HPS lamps up to 400 watts.



See screen shots of three available [LED HID replacement lamps](#) from Tungfram below.

According to Tungfram, “LED HID lamp offers safe, reliable and affordable energy saving alternative to HID lamps used in outdoor and industrial applications. ... This replacement can be completed simply without costly upgrade. The robust lamp design with E40 base ensures retrofitting and easy handle during installation. The upgraded fixture will deliver up to 80% energy saving and reduced operating cost driven by the increased life.”<sup>19</sup>

**TUNGSRAM**  
Innovation is our heritage  
EST. 1896

80 kWh/1000h | A++ energy class | 150 lumens/watt

**LED HID 80W**  
LED 80W/HID/740/E40 TU  
93105826

**Product information**  
LED HID lamp offers safe, reliable and affordable energy saving alternative to HID lamps used in outdoor and industrial applications. This 80W LED HID lamp can offer retrofit replacement for high watt E40 HID lamp installations, such as up to 150W High Pressure Sodium (HPS), 100W and 150W Ceramic Metal Halide (CMH), 175W and 250W Quartz Metal Halide (QMH) and 250W and 400W Mercury lamps. This replacement can be completed simply without costly upgrade. The robust lamp design with E40 base ensures retrofitting and easy handle during installation. The upgraded fixture will deliver up to 80% energy saving and reduced operating cost driven by the increased life.

**Application areas**

- Industrial
- Street and pedestrian
- Commercial areas

**TUNGSRAM** Products Documents Case studies News Resources Career Contact

Shipment: Shipment

Base: E27 E40

Bulb shape:

Wattage (W): 35 W 150 W

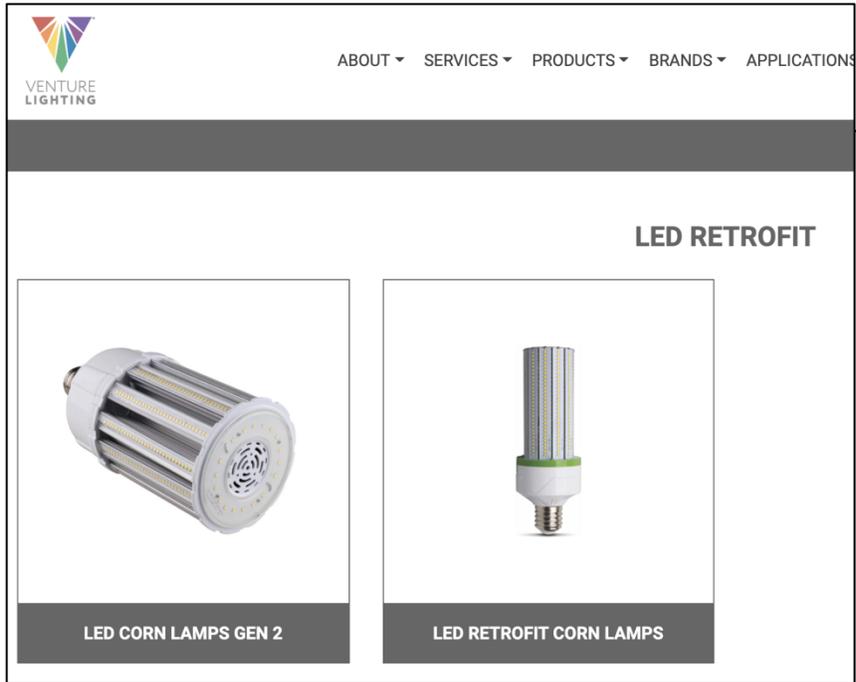
	LED Mercury	35	4750 - 4800	E27
	LED HID 80W	80	12000	E40
	LED HID 150W	150	23000	E40

<sup>19</sup> Tungfram, LED HID Lamps, *eCatalogue*, 2021, <https://catalog.tungfram.com/lamp/led-lamps/led-hid-mercury/d=0/?r=emea>

**LEDVANCE/Osram Sylvania's NAV LED Retrofit Lamps.** In May 2021, LEDVANCE launched a new family of lamps, [OSRAM NAV LED](#), which is a "direct LED retrofit for traditional high-pressure sodium vapour lamps in outdoor applications." According to LEDVANCE:

*They offer compelling benefits for areas of application such as streets, area lighting, pedestrian zones or parks. The new OSRAM NAV LED retrofit lamps increase efficiency on two different levels: consumption and maintenance. Not only do they consume up to 52 percent less energy than conventional high-pressure sodium vapor lamps, but they also reduce maintenance costs thanks to their lifetime of up to 50,000 hours. Besides cost savings, another bonus of the new product family is the easy replacement thanks to compatibility with conventional control gear (CCG), compensation capacitor and ignitor without rewiring. The so called "night-time switching" allows additional dimming at low traffic density. Finally, the OSRAM NAV LED also offer a very high efficiency of up to 185 lm/W.*

**Venture Lighting's LED Corn Lamps ([Generation 1](#) and [Generation 2](#))** come in a variety of wattages that can replace a wide variety of HID lamps and high-wattage CFLs in indoor and outdoor applications. Its 18-watt to 120-watt LEDs can replace a wide array of high-pressure sodium lamps up to 400 watts. These products have an A+ energy rating and a rated life of 50,000 hours, which is twice as long as standard HPS lamps.

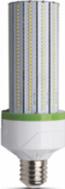



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## LED RETROFIT



**LED CORN LAMPS GEN 2**



**LED RETROFIT CORN LAMPS**





**VENTURE LIGHTING**

**RETROFIT RANGE**

**UP TO 120W**



Corn lamps are suitable for use indoors and in outdoor weatherproof fittings.

-  Retrofit for Industrial Applications
-  Retrofit for Exterior Applications

Retrofit Corn Lamps are an ideal upgrade route for aging HID lamps, whilst maintaining the look and integrity of the existing fitting.

Venture RTF Corn Lamps are designed with a large heatsink profile to reduce thermal stresses and the need for internal fans.

# CORN LAMPS

From our February 2020 submission, below is a table demonstrating that LED lamps can replace most of the commonly used high-pressure sodium (HPS) lamps up to 400 watts without having to replace the entire luminaire (although there are even more LED luminaires that can replace HID luminaires, particularly for street lighting and other outdoor illumination applications.) LED lamps and luminaires can replace both high- and low-CRI HPS – and other types of HID – lamps. LED lamps are in the area of the table below that is shaded green; they can replace HPS lamps in the table without shading.

### Examples of LED HPS Replacement Lamps from Major European Manufacturers

HPS Watts	HPS Lumens	HPS Brand	Hg (mg)	HPS Life (Hours)	HPS Model	LED Watts	LED Lumens	LED Brand	LED Life (Hours)	LED Model
50	3500	GE / Tungsram	16,6	40.000	LU/50/85/XO/SBY/D/E27 (Standby, long life, dual burner HPS)	23	3000*	Osram	50.000	HQL LED 3000 lm 23W840 E27
50	3600	Osram	9,8	28.000	NAV-E 50 W/E E27	25	4000*	Philips	50.000	TrueForce LED Public Road – SON 40-25W E27 730
50	3900	Philips	9,8	30.000	MASTER SON PIA Plus 50W/E27	27	3400*	Sylvania	50.000	Toledo Performer T60 3400LM 840 E27 SL
						30	3450*	ProcureLED	5-yr warranty	COR3040E27
70	6000	GE / Tungsram	10	28,500	LU70/90/MO/T/E27	35	4800*	Philips	50.000	35E23.5/LED/727/ND 120-277V E49 G2
70	6000	GE / Tungsram	19,9 (10/ burner)	50.000	LU70/90/X)/SBY/D/E27 (Standby, long life, dual burner HPS)	35	5500*	Philips	50.000	TrueForce LED Public Road – SON 55-35W E27 730
70	5900	Osram	12	24.000	NAV-E 70 W/I E27	36	4500*	Sylvania	50.000	Toledo Performer T85 4500LM 840 E27 SL
70	5900	Philips	20	30.000	MASTER SON PIA Plus 70W/E27	40	4300*	Venture LED	50.000	40W LED Corn Lamp, E27, 840
						40	4600*	ProcureLED	5-yr warranty	COR4040E27
100	9600	GE / Tungsram	13,3	28,500	LU100/100/MO/T/40	46	6000*	Osram	50.000	HQL LED 6000 lm 46 W/840 E27

HPS Watts	HPS Lumens	HPS Brand	Hg (mg)	HPS Life (Hours)	HPS Model	LED Watts	LED Lumens	LED Brand	LED Life (Hours)	LED Model
100	10.000	GE / Tungstram	26.6 (13,3/ burner)	60.000	LU100/XO/SBY/D/E40 (Standby, long life, dual burner HPS)	55	7500*	Philips	50.000	TrueForce LED Public Road – SON 112-68W E40 730
100	10.400	Osram	13,1	36.000	NAV-E 100 W Super 4Y	60	6900*	ProcureLED	5-yr warranty	COR6040E27
100	9700	Philips	20	36.000	MASTER SON PIA Plus 100W/220 E40	54	6800*	Sylvania	50.000	Toledo Performer T85 6500LM 840 E40 SL
150	15.300	GE / Tungstram	16,4	28.500	LU150/100/100/40	85	10.000*	Philips	25.000	TrueForce HB 100-85W E40 840 120D
150	16.100	Philips	20	36.000	MASTER SON PIA Plus 150W/220 E40	80	10.500*	Sylvania	50.000	Toledo Performer T85 10500LM 840 E40 SL
						80	10.800*	ProcureLED	5-yr warranty	COR8040E40
						80	12.000*	Osram	50.000	LED HID 80
250	28.500	GE / Tungstram	16,4	28,500	LU250T/40	95	13.000*	Osram	50,000	HQL LED PRO 95 W/840 E40
250	31.600	Osram	18,8	36.000	NAV-E 250 W SUPER 4Y	100	13.500*	ProcureLED	5-yr warranty	COR10040E40
250	30.900	Philips	20	36,000	MASTER SON PIA Plus 250W/220/E40	110	13.000*	Sylvania	50.000	Toledo Performer T85 13000LM 840 E40 SL

HPS Watts	HPS Lumens	HPS Brand	Hg (mg)	Life (Hours)	HPS Model	LED Watts	LED Lumens	LED Brand	Life (Hours)	LED Model
400	48.000	GE/ Tungsr am	15,8	28.500	LU400/T/40	140	20.000 *	Osram	50.000	HQL LED PRO 140 W/840 E40
400	56.500	Osram	18,8	36.000	NAV-E 400 W Super 4Y	145	20.000 *	Philips	50.000	TrueForce LED HPI/SON/HPL ND 200- 145W E40 840 60D
400	55.400	Philips	20	36.000	MASTER SON PIA Plus 400W/220/E40	150	23.000 *	GE/Tungsr am	50.000	LED HID 150
1000	130.00 0	GE / Tungsr am	24,8		LU1000			None found		

\*Manufacturer states that this is the proper and equivalent replacement despite lower lumens of the LED lamp due to the higher quality of the LED light, which makes the LED lumens more visually available. Only about 55% of the lumens in a low-CRI HPS lamp are visually available. So, the LED replacement lamps needs only about half of the lumens of the HPS lamp it is replacing.

LEDs are increasingly being made to replace HPS lamps and are expected to increase for this application. A study cited by the International Energy Agency found [LED and induction lamp] impacts were about 30% lower in global warming potential, respiratory effects and ecotoxicity compared to high pressure sodium and metal halide luminaires [for street lighting and other outdoor lighting applications].<sup>20</sup>

Finally, Philips has a line of MASTER SON-T Mercury-Free HPS Lamps that are A+ rated for energy efficiency and have a relatively long rated life of 38.000 hours. While these do not have the benefits of LEDs, they are a mercury-free product that can replace mercury-added HPS lamps.<sup>21</sup>

#### 4.4 **Proposed exemption 4e: Mercury in Metal Halide Lamps (MH)**

##### **Recommendation for Exemption 4(e): “Mercury in metal halide lamps”**

Discontinue exemption for Quartz Metal Halide Lamps, with a 12 month transition period.

Only allow an Exemption for Ceramic Metal Halide Lamps up to and including 250 Watts as well as all metal halides over 250 watts, to be reviewed in 3 years.

Monitor improved availability, performance and price of LED retrofit lamps for metal halide lamps and consider an expiry date for some types of MH lamps that are available on the market today.

##### **Summary – 4000 character text**

**We recommend that the exemption for Quartz Metal Halid lamps be discontinued, with a 12 month transition period. Exemptions for Ceramic Metal Halide Lamps up to and including 250 Watts as well as all metal halides over 250 watts, can be allowed to be reviewed in 3 years.**

Monitor improved availability, performance and price of LED retrofit lamps for metal halide lamps and consider an expiry date for some types of MH lamps that are available on the market today.

Due to time and resource constraints, we were unable to undertake a comprehensive analysis for metal halides lamps; however, also as per our 2015 and 2020 submission, we consider these comments/examples below sufficient for our recommendation that the Commission allows the mercury exemption to expire for quartz metal halide lamps.

Examples demonstrating that quartz metal halide lamps - particularly low-wattage models – can be easily replaced with more energy-efficient ceramic metal halide (CMH) lamps, which have a longer rated life and typically have less or the same amount of mercury, include:

Osram’s 2020 , [POWERBALL HCL-ET 70W](#),

<sup>20</sup> International Energy Agency, Solid State Lighting Annex: Life Cycle Assessment of Solid State Lighting: Final Report, 17 September 2014, [http://ssl.iea-4e.org/files/otherfiles/0000/0068/IEA\\_4E\\_SSL\\_Report\\_on\\_LCA.pdf](http://ssl.iea-4e.org/files/otherfiles/0000/0068/IEA_4E_SSL_Report_on_LCA.pdf)

<sup>21</sup> Philips Company, *Data Sheet for MASTER SON-T APIA Mercury-Free HPS Lamps*, 26 January 2018, <http://www.assets.lighting.philips.com/is/content/PhilipsLighting/comf1609-pss-global>

## [GE 150-watt ConstantColor Ceramic MH Lamp](#)

Philips - [250-watt MASTER Plus CityWhite Tubular Ceramic Metal Halide](#)

Since quartz and ceramic MH lamps are very often available with the same shape and size of lamps and bases, they are almost always interchangeable.

Therefore, offering the RoHS Exemption on the ceramic models only would result in use of these easy, drop-in replacements with multiple environmental benefits, including significant mercury reduction as well as energy savings.

Furthermore, since 2015 there has been a significant increase in the number of manufacturers offering LED replacement lamps for quartz metal halide lamps, such as:

GE/Tungshram , [LED HID 80W](#) lamp

Philips/Signify, [TrueForce LED Industrial and Retail \(High-Bay MH\) Lamps](#) , [TrueForce LED Urban](#) , [TrueForce LED Public \(Road\)](#) and [TrueForce CorePro LED lamps](#)

According to one lighting manufacturer, metal halide lamps have many inherent downsides, including the following:

- They have a long warm-up period (15-30 minutes), which wastes energy.
- They have a relatively short life (typically 6.000 to 15.000 hours “
- Metal halide lamps are omnidirectional.
- There is a small risk that a metal halide lamp can explode. In addition, metal halide lights emit UV radiation, which can damage eyes and skin. To prevent harm to people and damage to property, metal halide lamps are often removed from service early, which reduces their effective lamp life further.
- Metal halide lamps cycle when they reach the end of their life.

Replacing quartz metal halide lamps with LEDs will yield significant benefits as LEDs tend to last much longer, are more energy efficient and less maintenance intensive technology.

No more delays should occur in the decision-making process since as a consequence mercury will keep being added to the environment, additional CO2 emitted and millions of euro lost per day as [recent studies show](#).

Due to time and resource constraints, we were unable to undertake a comprehensive analysis for metal halides lamps; however, also as per our 2015 and 2020 submission, we consider these comments/examples below sufficient for our recommendation that the Commission allows the mercury exemption to expire for quartz metal halide lamps.

In our 2015 submission, we presented evidence demonstrating that quartz metal halide lamps – particularly low-wattage models – can be easily replaced with more energy-efficient ceramic metal halide (CMH) lamps, which have a longer rated life and typically have less or the same amount of mercury. Below are several examples:

- A review of Osram’s 2020 online catalogue revealed that its [POWERBALL HCL-ET 70W](#), is a ceramic metal halide lamp with a mercury content of (7,6 mg), a lumen output of 7500 lumens, an efficacy of 103 lumens/watt (Class A+), and a rated life of 16.000 hours. In comparison, Osram’s 70-watt [POWERSTAR HQL-ET 70W](#), which is a less-efficient quartz metal halide lamp, has a lower lumen output of only 5500 lumens, a lower efficacy of only 79 lumens/watt (Class A),



and a shorter rated life of only 6000 hours. It also has a slightly higher mercury content (8,0) than its ceramic metal halide counterpart.

- According to GE Lighting (now Tungsram) there are many benefits to ceramic MH lamps over quartz MH lamps, including their high efficiency and long life:



- Widest range of wattages from 20W to 400W
- Highly controllable point source of light
- Wide range of formats for designers flexibility
- GU6.5, G8.5, G12, E27/E40 and Rx7s
- MR16 and PAR reflectors
- Tubular and elliptical versions
- High efficacy – up to 111 lm/W<sup>22</sup>
- Long life – up to 24,000 hours
- Consistent colour over life
- Colour temperatures: 3000K & 4200K
- UV control
- Selection of approved ballasts

*From bright light and excellent colour rendering to high reliability, a long life and a choice of lamps to suit all kinds of different applications – indoors and outdoors – there are dozens of reasons to choose GE’s Ceramic Metal Halide (CMH) lamps, Applications range from accent and spot lighting to flood and area lighting, and they provide an extremely effective replacement for High Pressure Sodium (HPS) and Quartz Metal Halide Lamps.*

More reasons to choose GE’s CMH solutions:

According to a 2017 GE Lighting CMH Data Sheet, ceramic metal halide lamps have “up to 24% higher efficacy than quartz metal halide [lamps].” Another benefit of GE’s ceramic MH lamps is that they often have a lower mercury content when compared to its equivalent quartz MH lamp. For example:



- GE manufactures both quartz and ceramic double-ended MH lamps in equivalent wattages. Its **150-watt Arcstream Double-Ended Quartz MH Lamp**<sup>23</sup> has a mercury content of 14,5 mg, while its **150-watt ConstantColor Ceramic MH Lamp**<sup>24</sup> has a mercury content of only 10 mg. Moreover, while the quartz MH lamp has a Class A rating and a rated life of 12.000 hours, the equivalent ceramic MH lamp has a Class rating of A+ and a rated life of 15.000 hours.
- Philips offers a wide array of ceramic MH lamps that are environmentally preferable replacements for quartz MH lamps. For example, its **250-watt MASTER Plus CityWhite**

<sup>22</sup>GE Lighting Company (Europe), *Ceramic Metal Halide Lamps*, Accessed 15 October 2015, <http://www.gelighting.com/LightingWeb/emea/products/technologies/hid/cmh.jsp>

<sup>23</sup> GE Lighting Company (Europe), *Arcstream Double Ended Quartz Metal Halide Lamps with UV Control*, November 2013, [http://www.gelighting.com/LightingWeb/emea/images/Metal\\_Halide\\_Arcstream\\_Double\\_Ended\\_Lamps\\_Data\\_sheet\\_EN\\_tcm181-12560.pdf](http://www.gelighting.com/LightingWeb/emea/images/Metal_Halide_Arcstream_Double_Ended_Lamps_Data_sheet_EN_tcm181-12560.pdf)

<sup>24</sup>GE Lighting Company (Europe), *ConstantColor CMH TD Double Ended Ceramic Metal Halide Lamps: 35W, 70W and 150W*, August 2013, [http://www.gelighting.com/LightingWeb/emea/images/ConstantColor\\_CMH\\_TD\\_Double\\_Ended\\_Lamps\\_Data\\_sheet\\_EN\\_tcm181-12599.pdf](http://www.gelighting.com/LightingWeb/emea/images/ConstantColor_CMH_TD_Double_Ended_Lamps_Data_sheet_EN_tcm181-12599.pdf)

**Tubular Ceramic Metal Halide** lamp contains only 25,3 mg of mercury and has a Class A+ rating and a rated life of 27.000 hours.<sup>25</sup> In contrast, its equivalent 250-watt quartz MH lamp (MASTER HPI-T Plus Quartz Metal Halide Lamp) contains 36 mg of mercury and has a Class A+ rating, also, but a shorter rated life of 20.000 hours.<sup>26</sup>

Since quartz and ceramic MH lamps are very often available with the same shape and size of lamps and bases, they are almost always interchangeable.

Therefore, offering the RoHS Exemption on the ceramic models only would result in use of these easy, drop-in replacements with multiple environmental benefits, including significant mercury reduction as well as energy savings.

Since 2015, there has been a significant increase in the number of manufacturers offering LED replacement lamps for quartz metal halide lamps. Below are several examples of LED lamps that can replace quartz metal halide lamps available from European lamp manufacturers:

- **GE/Tungsrham** offers a line of LED lamps designed as drop-in replacements for HID lamps, including metal halides. For example, according to this manufacturer, its [LED HID 80W](#) lamp:

*...offers safe, reliable and affordable energy saving alternative to HID lamps used in outdoor and industrial applications. This 80W LED HID lamp can offer retrofit replacement for high watt E40 HID lamp installations, such as up to 150W High Pressure Sodium (HPS), 100W and 150W Ceramic Metal Halide (CMH), **175W and 250W Quartz Metal Halide (QMH)** and 250W and 400W Mercury lamps.*

*This replacement can be completed simply without costly upgrade. The robust lamp design with E40 base ensures retrofitting and easy handle during installation. The upgraded fixture will deliver up to 80% energy saving and reduced operating cost driven by the increased life.*

- **Philips/Signify** has developed a line of LED lamps that are drop-in replacements for quartz metal halide lamps in high-bay luminaires, which are often used in industrial facilities (e.g., warehouses, manufacturing plants, distribution centers), retail establishments (e.g., shopping centers and markets), sports stadiums, convention centers, transportation facilities, etc.

According to this manufacturer, **TrueForce LED Industrial and Retail (High-Bay MH) Lamps**, "give you a quick and-easy payback solution to replace HID lamps in Highbay applications. The solution gives you the LED benefits of energy-efficiency and long-lifetime, plus the initial investment is low. **The lamp design enables the direct retrofitting of HID lamps with TrueForce LED lamps without changing the fixtures or gear.** The lamp is compatible with both 250 W and 400 W gears, maximising the feasibility of such retrofits.



<sup>25</sup>Philips Company (UK), *MASTER CityWhite Ceramic Metal Halide Lamps*, 28 August 2013, [http://download.p4c.philips.com/l4bt/3/322972/master\\_citywhite\\_cdo-et\\_322972\\_ffs\\_eng.pdf](http://download.p4c.philips.com/l4bt/3/322972/master_citywhite_cdo-et_322972_ffs_eng.pdf)

<sup>26</sup> Philips Company (UK), *MASTER HPI-T Plus Quartz Metal Halide Lamps*, 29 August 2015, [http://download.p4c.philips.com/l4b/9/928481300098\\_eu/928481300098\\_eu\\_pss\\_enggb.pdf](http://download.p4c.philips.com/l4b/9/928481300098_eu/928481300098_eu_pss_enggb.pdf)

Philips' **TrueForce LED Urban** can replace HID (including quartz metal halides) with wattages ranging from 80W to 200W. According to this manufacturer, "Philips TrueForce LED lamps provide an easy LED solution with a fast payback to replace High-Intensity Discharge (HID) lamps. These lamps bring the energy efficiency and long lifetime benefits of LED to HID replacement, with a low initial investment delivering instant savings. With the right lamp size and light distribution, customers can easily retrofit TrueForce LED lamps into their existing system, thereby enhancing the light quality without having to change the fixtures or sacrifice the light effect."



Philips' **TrueForce LED Public (Road)** can replace HID from 70W – 150W that are commonly used to light streets, parks and pedestrian walkways. Its small profile enables it to fit into almost any fixture. It has an A++ energy efficiency rating and a rated life of 50.000 hours. According to this manufacturer, "...you can easily retrofit TrueForce LED road lamps into the existing systems without changing the luminaire's ballast or reflector while enhancing the lighting quality."



- **Philips' TrueForce CorePro LED lamps** can easily replace HID (including quartz metal halides) with wattages ranging from 50W to 125W. They have a lamp size and shape, base and light distribution comparable to many quartz metal halide lamps, and can be used in both indoor and outdoor fixtures. See screenshot from product datasheet, right.



- **LEDVANCE/Osram Sylvania has a variety of LED lamps that can replace HID lamps**, including quartz metal halides up to 400 watts. These lamps can be used in either indoor or outdoor fixtures – and sometimes in both. They come in a variety of sizes, shapes and lumen outputs, and are designed for use in various applications including high-bay applications (e.g., warehouses and manufacturing facilities), retail, street lighting and more.



- **ProcureLED** offers a line of **LED "Corn Lamps"** marketed as a "Direct Replacement for Metal Halide" that can fit "many different fixtures to replace traditional lamps", used to light factories, workshops, warehouses, shipyards, mining, gas stations, streets, etc."<sup>27</sup>

<sup>27</sup> ProcureLED LED Corn Lamps; March 2019, <https://procureled.com/wp-content/uploads/2019/03/Corn-Lamps-ProcureLED.pdf>

According to one lighting manufacturer, metal halide lamps have many inherent downsides, including the following:

- They have a long warm-up period (15-30 minutes), which wastes energy.
- They have a relatively short life (typically 6.000 to 15.000 hours “The problem is that over time you will have to purchase a whole lot of metal halides (2-5) to equal the lifespan of a single LED. Overall that means very high maintenance costs over time.”
- Metal halide lamps are omnidirectional. “This is a large system inefficiency because at least half of the light needs to be reflected and redirected to the desired area being illuminated.”
- There is a small risk that a metal halide lamp can explode. In addition, metal halide lights emit UV radiation, which can damage eyes and skin. To prevent harm to people and damage to property, metal halide lamps are often removed from service early, which reduces their effective lamp life further.
- Metal halide lamps cycle when they reach the end of their life. This is another reason why they are often removed before the end of their useful life since cycling can result in a lighting outage, which can negatively impact performance and present safety risks.

Replacing quartz metal halide lamps with LEDs will yield significant benefits: “Compared to metal halides, LEDs tend to last much longer and are a more energy efficient and less maintenance intensive technology.”<sup>28</sup>

#### **4.5 UV LED technology**

**This chapter refers to the following exemption categories**

- [1f I - For lamps designed to emit mainly light in the ultraviolet spectrum: 5 mg , proposed to expire in 5 years.](#)
- [2b4 II Lamps emitting mainly light in the ultraviolet spectrum: 15 mg. proposed to expire in 5 years](#)
- [4a - Mercury in low pressure non-phosphor coated discharge lamps, where the application requires the main range of the lamp-spectral output to be in the ultraviolet spectrum: up to 15 mg mercury may be used per lamp, proposed to expire in 5 years](#)
- [4fIV Mercury in high pressure sodium vapour lamps emitting light in the ultraviolet spectrum, proposed to expire in 5 years](#)

The global markets for UV LED technology are growing very rapidly. Consequently, we urge the Commission to reevaluate this Exemption in three years, rather than granting a five-year exemption with no expiry date.

According to one market report, “Amid the COVID-19 crisis, the global market for UV LED Technology estimated at US\$378.6 Million in the year 2020 is projected to reach a revised size of US\$3 Billion by 2027.”<sup>29</sup>

With respect to using LEDs to generate UV for Disinfection, LED has many advantages over using mercury-added lamps to do the same thing. According to OSRAM, LED UV technology has the following benefits:

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<sup>28</sup> Stouch Lighting, “Lighting Comparison: LEDs Versus Metal Halide Lights,” 5 December 2017, <https://www.stouchlighting.com/blog/led-lights-versus-metal-halide>

<sup>29</sup> StrategyR, “UV LED Technology: Global Market Trajectory & Analysis,” Global Markets for LED Disinfection: <https://www.strategyr.com/market-report-uv-led-technology-forecasts-global-industry-analysts-inc.asp>, accessed on 06 July 2021.

- UV-C LEDs are environmentally friendly in comparison to mercury lamps. UV-C LEDs do not contain mercury.
- Flexible design: Due to their small footprint and DC operating feature, they allow for flexible and compact designs.
- Durability: Compare to mercury lamps, UV-C LEDs are much more robust to mechanical influences as they do not contain fragile glass components.
- Operation: UV-C LEDs instantly provide full optical output when turned on and stop immediately when switched off. Making cycling at high frequency possible. No pre-heating necessary.<sup>30</sup>

Furthermore, please consider submission from [Typhon Treatment systems](#) – submitted on 4 February 2019 to the Commission.

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<sup>30</sup> OSRAM Opto Semiconductors, “Disinfection and Purification With UV-C LEDs from ams OSRAM, <https://www.osram.com/os/applications/uv-c/index.jsp>, accessed on 07 July 2021.